

## WHAT IS CLAIMED IS:

1. An electron source comprising:
  - 2 a plurality of cold cathodes distributed on a substrate;
  - 3 a plurality of windows disposed within a support structure a predetermined
  - 4 distance from the substrate; and
  - 5 scanning electrodes for each of the plurality of cold cathodes, wherein the
  - 6 scanning electrodes are positioned so that each of the plurality of cold cathodes scans
  - 7 its electron beam to a plurality of the windows.
- 1 2. The electron source as recited in claim 1, wherein the plurality of windows are
- 2 positioned relative to each other in staggered rows.
- 1 3. The electron source as recited in claim 2, wherein a first one of the staggered
- 2 rows is staggered relative to a second one of the staggered rows.
- 1 4. The electron source as recited in claim 2, wherein the plurality of windows
- 2 enable a substantially uniform beam of electrons to be emitted from the electron
- 3 source.
- 1 5. The electron source as recited in claim 1, wherein the plurality of windows are
- 2 configured to permit passage of the electron beams.
- 1 6. The electron source as recited in claim 5, wherein the plurality of windows
- 2 each comprise a foil film.

- 1        7.     An electron source comprising:
- 2                a cold cathode;
- 3                an evacuated vacuum envelope enclosing the cold cathode;
- 4                circuitry for creating an electric field sufficient to cause an electron beam to be
- 5                emitted from the cold cathode; and
- 6                a window in the evacuated vacuum envelope to permit passage of the electron
- 7                beam externally from the envelope.

1       8. A method for operating an electron source, comprising the step of activating  
2       an electric field to cause an emission of an electron beam from a cold cathode within  
3       an evacuated envelope in a manner so that the electron beam passes externally from  
4       the envelope through a window in the envelope.

1       9. The method as recited in claim 8, further comprising the step of positioning an  
2       object relative to the electron source so that the electron beam emitted externally from  
3       the electron source irradiates the object, wherein the object is external to the  
4       evacuated envelope.